

**Remarks**

Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-33 as obvious under 35 U.S.C. § 103(a) and as unpatentable under the judicially created doctrine of obviousness-type double patenting.

**I. The June 18, 2007 Office Action**

Applicants acknowledge the withdrawal of the restriction requirement of the Office action dated June 18, 2007 and withdrawal of the Office action in its entirety including the nonstatutory obviousness-type double patenting rejection based on claims 1-99 of U.S. Patent No. 7,141,532. Applicants are entitled to withdraw the terminal disclaimer they submitted with the Letter to the Patent Office dated October 5, 2007.

**II. Rejection of Claims 1-33 as Obvious under 35 U.S.C. § 103(a)**

Applicants respectfully request reconsideration of the rejection of claims 1-33 as obvious under 35 U.S.C § 103(a) over the combined teachings of WO 01/08492 to Massmann et al., U.S. Patent No. 5,070,197 to Chin et al. and U.S. Patent No. 4,405,531 to Franz and the rejection of claims 1-33 as obvious over U.S. Patent No. 5,070,197.

Applicants have previously discussed and characterized the invention as defined in original independent claims 1 and 19, the disclosures of Massmann et al. (specifically that of WO 01/08492 which corresponds to U.S. Patent No. 6,605,568), Chin et al. and Franz in their Letters to the Patent and Trademark Office filed December 21, 2005, July 14, 2006, December 6, 2006 and October 5, 2007. Applicants submit that the pending claims remain patentable over the cited references for the reasons set forth in the above-mentioned responses. However in light of the

change in Examiners and withdrawal of the previous Office action, applicants will again characterize the pending claims and prior art.

Claim 1 is directed to a process for preparing a sodium glyphosate composition comprising mixing in a reactor particulate glyphosate acid, sodium hydroxide, water and optionally adjuvant to form a reaction mass wherein the total amount of water added to the reaction mass is from about 10% to about 40% by weight of all of the particulate glyphosate acid, sodium hydroxide, water and any adjuvant added to the reactor. The glyphosate acid and sodium hydroxide react exothermically, generating heat and causing partial evaporation of the water and forming a sodium glyphosate paste having a moisture content of about from 2% to about 20% by weight.

Independent claim 19 is directed to a continuous process for preparing a dry granular sodium glyphosate composition. The process comprises continuously feeding particulate glyphosate acid, sodium hydroxide, water and optionally adjuvant to a continuous reactor to form a reaction mass and reducing the water content of the reaction mass to first form a sodium glyphosate paste in accordance with claim 1. An adjuvant is added to the sodium glyphosate paste to form an extrudable sodium glyphosate mixture with the weight ratio of total adjuvant to sodium glyphosate being from about 1:20 to about 1:2 on a glyphosate acid equivalent basis. The extrudable sodium glyphosate mixture is fed continuously to an extruder having an inlet, a conveyor and an outlet having a screen and is extruded through apertures in the screen to form extrudate strands that break to form moist coherent granules. The granules are subsequently dried to produce the dry granular sodium glyphosate composition.

The claimed invention produces a downstream processable sodium glyphosate paste composition of the requisite moisture content by reacting particulate glyphosate acid and sodium hydroxide in a reaction mass wherein the total amount of water added to the reaction mass is from about 10% to about 40% by weight of all of the particulate glyphosate acid, sodium hydroxide, water and any adjuvant added to the reactor. Reacting glyphosate acid and sodium hydroxide in a reaction mass in this manner allows the reaction mixture to be more readily homogenized, enabling the reaction to proceed more smoothly and completely, with greater ease of temperature control as compared to conventional solid-state reaction systems and ensures sufficient moisture remains after evaporative cooling of the reaction mass to form a downstream processable sodium glyphosate paste of the desired consistency. Surprisingly, the sodium glyphosate paste produced in accordance with the claimed process has been found to have the required absorbency and/or adsorbency properties to enable efficient formulation as a dry granular herbicidal composition by: adding adjuvant to the downstream processable sodium glyphosate paste to form an extrudable sodium glyphosate mixture; extruding the extrudable sodium glyphosate mixture to form moist coherent granules; and drying the granules. Thus, the present invention combines rapidity, completeness and uniformity of reaction to produce a sodium glyphosate product exhibiting desirable qualities suited for downstream processing and formulation.

The PCT Publication of Massmann et al., WO 01/08492, is referenced at paragraph [0015] of the subject application and describes a process for forming an ammonium glyphosate paste by mixing glyphosate acid, ammonia in an amount of about 0.8 to about 1.25 moles of ammonia per mole of glyphosate acid, and

water in an amount of about 10% to about 25% by weight of all materials mixed, thereby causing a reaction of the glyphosate acid and ammonia that generates heat causing partial evaporation of the water and forms the ammonium glyphosate paste having a moisture content of about 5% to about 20% by weight. The paste can optionally be extruded to form dried granules. In particular, Massmann et al. note the surprising ability of the ammonium glyphosate paste to serve as an intermediate in the preparation of dry granular herbicidal compositions due to the superior surfactant absorbency and/or adsorbency properties exhibited by the paste without the restrictions imposed by solid-state reaction processes (WO 01/08492, page 14, lines 5-18) such as the process described by Chin et al. (referenced by Massmann et al. at page 4, lines 11-16).

Chin et al. disclose a continuous extrusion process in which a pesticidal Bronsted acid is admixed with a Bronsted base and reacted in an extruder. Glyphosate acid is mentioned among over four dozen other pesticidal Bronsted acids. The most preferred Bronsted bases include NaOH, KOH,  $(C_2H_5)_2NH$ ,  $(C_2H_5)_3N$ ,  $(HOC_2H_4)_2NH$  or  $(HOC_2H_4)_3N$ . The so-called "dry reactive method" disclosed by Chin et al. is performed essentially without the addition of any extraneous solvent (e.g., water) and under conditions where the water of reaction volatilizes and is driven off by the resultant heat of reaction so that a solid end product of dry water-soluble or water-dispersible pesticide can be formed in a single step (See, for example, col. 1, lines 52-62; col. 2, lines 14-17; and col. 4, lines 51-53). Thus, in contrast to applicants' claimed process requiring the production of a sodium glyphosate paste, the process of Chin et al. is conducted in a manner to produce a solid product essentially

free of moisture and having a residual water content preferably not in excess of 5% by weight or less (See col. 4, lines 39-42).

Franz is directed to glyphosate derivatives and the activity of glyphosate and its derivatives as a herbicide. The reference discloses lab scale production of glyphosate salts including the monopotassium (Example 3) and mono-dimethylamine (Example 4) salts of glyphosate. The salts are obtained by the liquid-phase neutralization of glyphosate acid with the appropriate base followed by crystallization of the glyphosate salt by concentration of the neutralization solution.

**A. The Obviousness Rejection based on the Combined Teachings of Massmann et al., Chin et al. and Franz**

On page 3 of the Office action the Office contends that one with ordinary skill in the art would replace the ammonia reactant of the process of Massmann et al. with sodium hydroxide taught by Chin et al. or Franz because both ammonia and sodium hydroxide are bases. The Office appears to be applying at least one of two possible rationale for obviousness: (1) that some teaching, suggestion, or motivation in the prior art would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention (MPEP § 2143(G)) or (2) that a substitution for one known element for another to obtain predictable results is nonobvious (MPEP § 2143(B)). Applicants submit that the Office has failed to establish a *prima facie* case of obviousness under either rationale.

**i. The Prima Facie Case of Obviousness Based on a Teaching, Suggestion, or Motivation in the Prior Art**

To reject a claim as obvious based on a teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference to arrive at the claimed invention, the Office must establish (1) that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, (2) that there was a reasonable expectation of success, and (3) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness. Applicants submit that the Office has failed to establish a *prima facie* case of obviousness as there is no motivation to replace ammonia with sodium hydroxide in the process of Massmann et al. and because the Office has not established a reasonable expectation that the substitution would be successful.

Although Massmann et al. describe a process for the preparation of an ammonium glyphosate composition in the form of a paste suitable for downstream processing to prepare a dry granular ammonium glyphosate composition, the reference does not teach or suggest the suitability of the disclosed process for producing a paste of a glyphosate salt other than ammonium glyphosate, and in fact discourages one skilled in the art from using the disclosed process to produce a sodium glyphosate composition. It is improper to combine references where the references teach away from their combination. MPEP § 2145(X)(C)(3). To the extent Massmann et al. suggest anything regarding sodium glyphosate compositions, the reference teaches

that such compositions are disfavored as compared to ammonium glyphosate when preparing dry glyphosate formulations due to the hygroscopic nature of sodium glyphosate and its tendency to reabsorb water, resulting in a loss of free-flowing properties (See page 3, lines 12-23 of Massmann et al.). Thus, Massmann et al. discourage one from substituting sodium hydroxide into their disclosed process.

Regarding the disclosures of Chin et al. and Franz, the Office has not established a teaching, suggestion, or motivation outside of the fact that both ammonia and sodium hydroxide are bases. The reasoning of the Office fails to establish why the skilled artisan would find it desirable or advantageous to substitute ammonia for sodium hydroxide in the process of Massmann et al.

Furthermore, as more fully discussed below, the Office has failed to establish why the skilled artisan would expect to successfully produce a glyphosate paste composition with the required absorbency and/or adsorbency properties to enable efficient formulation as a dry granular herbicidal composition by replacing ammonia with sodium hydroxide in the process of Massmann et al.

Because the Office has failed to articulate any teaching, suggestion or motivation to substitute ammonia with sodium hydroxide in the process of Massmann et al., because Massmann et al. teach away from such substitution and because the Office has not articulated why the skilled artisan would expect the substitution to be successful, the Office has not established a *prima facie* case of obviousness.

**ii. The Prima Facie Case of Obviousness Based on a Simple Substitution of One Known Element for Another To Obtain Predictable Results**

To reject a claim on the basis of a simple substitution of one known element for another to obtain predictable results, the Office must establish that (1) the prior art contained a method which differed from the claimed method by the substitution of some components with other components, (2) the substituted components and their functions were known in the art, (3) one of ordinary skill in the art could have substituted one known element for another, and the results of the substitution would have been predictable, and (4) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness. Applicants submit that the Office has failed to establish a *prima facie* case of obviousness because the Office has failed to articulate why substitution of ammonia in the process of Massmann et al. with sodium hydroxide would lead to predictable results, namely that the resulting sodium glyphosate paste would exhibit the required absorbency and/or adsorbency properties to enable efficient formulation as a dry granular herbicidal composition. The Office failed to articulate any specific reasoning from the disclosures of Massmann et al., Chin et al. and Franz or from the knowledge of one of ordinary skill in the art why the results of the substitution would be predictable.

The Office has not identified any reason based upon the disclosure of Massmann et al. for the skilled artisan to believe substitution of ammonia with sodium hydroxide would lead to predictable results. Indeed Massmann et al. do not disclose that the process described therein is compatible with any other



base and as discussed above, teach away from use of sodium hydroxide as a base.

The Office has not identified any reason based upon the disclosure of Chin et al. for the skilled artisan to expect that substitution of ammonia with sodium hydroxide in the process of Massmann et al. would lead to predictable results. While sodium hydroxide is listed among the most preferred Bronsted bases for use in the so-called "dry-reactive method" of Chin et al. (performed essentially without the addition of any extraneous solvent (e.g., water) and under conditions where the water of reaction volatilizes and is driven off by the resultant heat of reaction so that a solid end product can be formed in a single step), that preference does not suggest that substitution of ammonia with sodium hydroxide in the process of Massmann et al. would lead to a desirable glyphosate paste composition.

The Office has not identified any reason based upon the disclosure Franz for the skilled artisan to expect that substitution of ammonia with sodium hydroxide in the primary reference would lead to predictable results. Although the sodium salt of glyphosate is included by Franz in the disclosure of numerous N-(phosphonomethyl)glycine derivatives, the reference does not even go so far as to teach the use of sodium hydroxide as a suitable base. Example 3 is directed to the liquid phase neutralization of glyphosate with a potassium carbonate base, a markedly different process than the processes defined by the pending claims.

The Office contends that Franz discloses the use of sodium hydroxide as a base in Example 1. However, Example 1 is directed to the much different process of producing glyphosate acid by phosphonomethylating glycine with chloromethylphosphonic in a caustic reaction solution followed by acidifying the

reaction mixture with concentrated hydrochloric acid rather than neutralization of glyphosate acid with sodium hydroxide base to form a sodium glyphosate composition. Predictability in substituting ammonia with sodium hydroxide in the markedly different process of Massmann et al. for forming an ammonium glyphosate paste is not apparent from the teaching in the disclosure of Franz.

Further, the Office has not articulated any reasoning why applicants would expect predictable results based upon the knowledge of the skilled artisan. The skilled artisan would not understand that the substitution of ammonium for any one of a numerous choice of bases in the process of Massmann et al. would result in a glyphosate salt composition with desirable qualities merely because the process of Massmann et al. produces a desirable ammonium glyphosate paste composition. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art. MPEP § 2143.01(III)

Because the Office has failed to articulate any reasoning why the skilled artisan would expect predictable results in the substitution of ammonia for sodium hydroxide in the process of Massmann et al., the Office has not established a *prima facie* case of obviousness. Because the Office has failed to establish a *prima facie* case of obviousness, applicants are not required to submit unexpected results at this time.

**B. The Obviousness Rejection based on the Teachings of Chin et al.**

Applicants respectfully requests reconsideration of the rejection of claims 1-33 as obvious under 35 U.S.C § 103(a) over

the teachings of Chin et al. Applicants respectfully submit that the claimed invention is not an optimization of the process disclosed by Chin et al. because the Office has failed to establish that the general conditions of the claims are disclosed in the prior art. The Office must establish that the general conditions of the claim are disclosed in the prior art before a claim may be found as an obvious optimization of ranges. MPEP § 2144.05 (II)(A); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The claimed process is much more extensive than an optimization of the process of Chin et al. because Chin et al. fail to teach or suggest a critical requirement of the claimed process, namely formation of a sodium glyphosate **paste** composition.

Contrary to the opinion of the Office, the process of Chin et al. does not result in a sodium glyphosate paste as required by independent claims 1 and 19. Rather, the process of Chin et al. is conducted in a manner to produce a solid product essentially free of moisture and having a residual water content preferably not in excess of 5% by weight or less (See col. 4, lines 39-42).

Given that the stated primary objective of Chin et al. is to form a solid pesticidal salt product (See col. 4, lines 51-53), the reference fails to teach or suggest a process conducted in a manner to form a **paste** product as called for in the instant claims, including addition of a sufficient amount of water to the reaction mass. Although optional water addition to the reaction mixture is mentioned for purposes of serving as a diluent for the Bronsted base, heat sink and/or lubricant (See col. 1, lines 62-67; and col. 4, lines 6-8), Chin et al. teach that it is advisable to first determine whether it is feasible to conduct the reaction in the absence of a heat sink such as

water (See col. 4, lines 14-16). If water is added to the reactor, the amount is determined by the exotherm to be controlled, the heat capacity of the water and the amount of water (including water produced by the reaction, if any) to be driven off by the heat of reaction (See col. 4, lines 8-13). Thus, the clear preference and teaching in Chin et al. is that the reaction be performed essentially without the addition of any extraneous water to the reaction mixture and the process be conducted and controlled in a manner so that free water is driven off to an extent sufficient to form a solid end product.

Consistent with this teaching, in the only example of Chin et al. where sodium hydroxide and glyphosate acid were reacted (See Example 2), powdery glyphosate acid and sodium hydroxide were combined in a reactor/extruder to form a water-soluble product without the addition of extraneous water to the reactor/extruder. Thus, the only source of water in Example 2 is the water produced during the reaction. It is not possible to calculate the weight percent of the water of reaction in Example 2 since the relative quantities of glyphosate acid and sodium hydroxide charged to the reactor/extruder and the extent of reaction are not specified. Nevertheless, even assuming substantially complete equimolar reaction of the glyphosate acid and sodium hydroxide (thereby maximizing the weight percent of water added), the maximum amount of water added to the reaction mass by weight of all the particulate glyphosate acid, sodium hydroxide and water added to the reactor/extruder would be only 8.6% as determined by dividing the molecular weight of water by the sum of molecular weights of glyphosate and sodium hydroxide ( $18/(169 + 40)$ ).

The proper amount of water addition necessary for formation of a glyphosate salt paste will vary depending upon, among other

things, the base utilized in the process. Chin et al. do not disclose or suggest how much water is to be added to the reaction mixture to form a glyphosate salt paste for any of the range of Bronsted bases disclosed as suitable for forming solid glyphosate salts (i.e., those listed in col. 3, lines 25-39). In particular, the reference fails to disclose or suggest a process as called for in the pending claims in which water is added to the reaction mass in an amount from about 10% to about 40% by weight of the particulate glyphosate acid, sodium hydroxide and water added to the reactor and the extent of partial evaporation controlled to form a sodium glyphosate paste having a moisture content of from about 2% to about 20% by weight.

In view of the above, applicants respectfully maintain that the Office has failed to establish a *prima facie* case of obviousness with respect to independent claims 1 and 19 and claims depending therefrom.

### **III. The Rejection of Claims 1-33 on the Ground of Nonstatutory Obviousness-type Double Patenting**

Applicants respectfully request reconsideration of the rejection of claims 1-33 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over (1) claims 1-44 of U.S. Patent No. 6,605,568 to Massmann et al. in view of U.S. Patent No. 5,070,197 to Chin et al. and U.S. Patent No. 4,405,531 to Franz or over (2) claims 1-127 of U.S. Patent No. 6,734,142 to Massmann et al. in view of U.S. Patent No. 5,070,197 and U.S. Patent No. 4,405,531.

Contrary to the assertion of the Office, substitution of sodium hydroxide for the ammonium base of the processes claimed in the Massmann et al. references would not have been obvious.

The claims of the Massmann et al. references provide no teaching or suggestion of the suitability of the processes claimed therein for preparation of glyphosate salt compositions other than ammonium glyphosate. While sodium hydroxide and ammonia are both listed among the Bronsted bases for use in the so-called "dry-reactive method" of Chin et al. to form a solid pesticidal end product, that disclosure does not render sodium hydroxide equivalent to an ammonium base for substitution in the markedly different processes claimed in the Massmann et al. references for forming an ammonium glyphosate paste. Further, the feasibility or desirability of substituting sodium hydroxide for ammonia in the markedly different process of Massmann et al. for forming an ammonium glyphosate paste is not apparent from the teaching in the disclosure of Franz. The proper amount of water addition necessary for formation of a glyphosate salt paste will vary depending upon, among other things, the base utilized in the process, and Massmann et al. do not teach how much water is to be added to the reaction mixture to form a glyphosate salt paste other than when reacting ammonia and glyphosate acid.

Accordingly, and in further view of the response to the rejection under 35 U.S.C. § 103(a), applicants submit that the processes defined in claims 1-33 are patentably distinct from the invention as claimed in U.S. Patent No. 6,605,568 and U.S. Patent No. 6,734,142, in view of Chin et al. and Franz.

Applicants authorize the Office to charge any fee deficiency or credit any overpayment in connection with this response to Deposit Account No. 19-1345.

Respectfully submitted,

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